What is Claimed is:

1. An optical lens that generates a focused output optical signal, comprising:

a waveguide that includes an input port wherein the input optical signal is introduced into the waveguide, an output port wherein the focused output optical signal exits the waveguide, and a region of focusing propagation constant disposed along a length of the waveguide and between the input port and the output port, wherein the input optical signal is guided by total internal reflection in the waveguide, and the waveguide is formed at least in part from an active semiconductor;

a first electrode positioned proximate a first surface of the region of focusing propagation constant and electrically separated from the active semiconductor;

a second electrode in electrical contact with the active semiconductor and disposed on a first side of the region of focusing propagation constant;

a two-dimensional electron (hole) gas (2DEG) having a free carrier distribution that is formed on the first surface when a voltage is applied between the first electrode and the second electrode; and

wherein changing the voltage causes a corresponding change of the free carrier distribution which, in turn, causes corresponding change of a propagation constant level in the region of focusing propagation constant and adjustment of a focal length of the optical lens.

2. The optical lens of claim 1, further comprising a third electrode in electrical contact with the active semiconductor disposed on a second side of the region of focusing propagation constant opposite the first side; wherein the second and third electrodes are electrically coupled to a common potential.

3. The optical lens of claim 1 or 2, wherein the 2DEG is oriented in a plane that is substantially parallel to said length.

4. The optical lens of claim 2, further comprising a field effect transistor (FET) portion that includes the first, second, and third electrodes.

5. The optical lens of claim 4, wherein the FET portion is from one of the group of metal-oxide-semiconductor FET (MOSFET), metal-electrical insulator-semiconductor FET (MISFET), a metal semiconductor field effect transistor (MESFET), a high electron mobility transistor (HEMT), or a modulation doped FET (MODFET).

6. The optical lens of claim 1, further comprising a metal oxide semiconductor capacitor (MOSCAP) portion.

7. The optical lens of claim 6, wherein the body contact electrode is located below the waveguide.

8. The optical lens of claim 1, wherein the waveguide comprises any group III or group V semiconductor.

9. The optical lens of claim 1, wherein the free-carrier distribution of the 2DEG layer is varied by changing the voltage applied to the first electrode, and wherein light flowing through the waveguide is controllably attenuated in response to the voltage applied to the first electrode.

10. An optical lens having a focal length that varies by changing a propagation constant level of a region of focusing propagation constant of a waveguide, comprising:

a gate electrode having a prescribed electrode shape positioned proximate the waveguide;

a voltage source connected to the gate electrode for applying voltage to the gate electrode, wherein the voltage causes the gate electrode to project into the waveguide the region of focusing propagation constant, said region of focusing propagation constant corresponding generally in shape to the prescribed electrode shape and focusing light flowing through the waveguide; and

a controller that controls the propagation constant level of the region of focusing propagation constant and the focal length by varying the voltage applied to the gate electrode to adjustably focus light flowing through the waveguide.

11. The optical lens of claim 10, wherein the 2DEG is oriented in a plane that is substantially parallel to the region of focusing propagation constant.

12. The optical lens of claim 10, further comprising a field effect transistor (FET) portion including a source electrode and a drain electrode.

13. The optical lens of claim 10, wherein the FET is from one of the group of metal-oxide-semiconductor FET (MOSFET), metal-electrical insulator-semiconductor FET (MISFET), a metal semiconductor field effect transistor (MESFET), a high electron mobility transistor (HEMT), or a modulation doped FET (MODFET).

14. The optical lens of claim 10, further comprising one or more body contact electrode(s) positioned relative to the waveguide and electrically integrated with the active semiconductor.

15. The optical lens of claim 14, further comprising a metal oxide semiconductor capacitor (MOSCAP) portion that includes the body contact electrode.

16. The optical lens of claim 14, wherein the body contact electrode is located below the waveguide.

17. The optical lens of claim 14, wherein the body contact electrode includes a first body contact electrode and a second body contact electrode, the first body contact electrode, the gate electrode, and the second body contact electrode are located above the waveguide.

18. The optical lens of claim 17, wherein the first body contact electrode is located on an opposed side of the gate electrode from the second body contact electrode, and wherein the waveguide comprises any group III or group V semiconductor.

19. The optical lens of claim 10, wherein the free-carrier distribution of the 2DEG layer is varied by changing the voltage applied to the gate electrode, and wherein light flowing through the waveguide is controllably attenuated in response to the voltage applied to the gate electrode.

20. The optical lens of claim 10, further comprising an optical device coupled with a variable coupling to the optical lens.

21. A method for focusing light by changing a propagation constant level of a region of focusing propagation constant of a waveguide in an optical device, the method comprising:

positioning a planar electrode proximate the waveguide;

applying a voltage to the planar electrode to change the level of propagation constant in the region of focusing propagation constant in the waveguide wherein the region of focusing propagation constant corresponds in shape to the planar electrode

shape; and

controlling a propagation constant level of the region of focusing propagation constant and the focal length of the device by varying the voltage to control the focusing of light flowing in the waveguide.

22. The method of claim 21, further comprising a 2DEG located between the planar electrode and the body contact electrode, wherein the 2DEG is oriented in a plane that is substantially parallel to a length of the region of focusing propagation constant.

23. The method of claim 21, further comprising a field effect transistor (FET) portion including a planar electrode.

24. The method of claim 21, wherein the FET is from one of the group of metal-oxide-semiconductor FET (MOSFET), metal-electrical insulator-semiconductor FET (MISFET), a metal semiconductor field effect transistor (MESFET), a high electron mobility transistor (HEMT), or a modulation doped FET (MODFET).

25. The method of claim 21, further comprising one or more body contact electrode(s) positioned relative to the waveguide and electrically integrated with the active semiconductor.

26. The method of claim 21, further comprising a metal oxide semiconductor capacitor (MOSCAP) portion including the body contact electrode.

27. The method of claim 26, wherein the body contact electrode is positioned below the waveguide.

28. The method of claim 26, wherein the body contact electrode includes a

first body contact electrode and a second body contact electrode, the first body contact electrode, the planar electrode, and the second body contact electrode are located above the waveguide; and the first body contact electrode is located on an opposed side of the planar electrode from the second body contact electrode.

29. The method of claim 21, wherein the waveguide comprises any group III or group V semiconductor.

30. The method of claim 21, wherein the free-carrier distribution of the 2DEG layer is changed by changing the voltage applied to the planar electrode, and wherein light flowing through the waveguide is controllably changed in response to changing the free-carrier distribution of the 2DEG layer.

31. The method of claim 21, further comprising an optical device coupled with a variable coupling to the optical lens.

32. A computer readable medium containing software that controls a planar electrode having a prescribed shape positioned proximate a waveguide, said software when executed by a processor causes the processor to perform the steps of:

projecting a region of focusing propagation constant into the waveguide that corresponds in shape to the prescribed shape, by applying a voltage to the electrode; and

controlling a propagation constant level of the region of focusing propagation constant and a focal length by varying the voltage to control focusing of light flowing through the waveguide.

33. An optical lens for focusing light flowing through a waveguide by changing the propagation constant level of the waveguide, the optical lens comprising:

a region of focusing propagation constant disposed along a length of the waveguide and defining a region where light is focused, wherein the light is guided within the waveguide by total internal reflection, and the waveguide is formed at least in part from an active semiconductor;

a Field Effect Transistor portion (FET portion) including a gate electrode, a source electrode, and a drain electrode; the gate electrode is mounted to, but electrically insulated from, the active semiconductor; the drain electrode and the source electrode are held at a substantially common voltage; wherein the gate electrode, the source electrode, and the drain electrode are positioned substantially above the waveguide, the source electrode is located on a substantially opposed side of the gate electrode from the drain electrode;

a two-dimensional electron (hole) gas (2DEG) forming a layer having a free carrier distribution that is formed on a first surface of the waveguide when a voltage is applied between the gate electrode and the common voltage;

a voltage source connected to the gate electrode for applying the voltage to the gate electrode, wherein the gate electrode projects the region of focusing propagation constant into the waveguide to focus light flowing through the waveguide; and

a controller for controlling the propagation constant level of the region of focusing propagation constant and a focal length of the lens by varying the voltage produced by the voltage source to control the focusing of light flowing within the waveguide.

34. An apparatus for focusing an input optical signal in order to generate a focused output optical signal, comprising:

a planar electrode positioned proximate the waveguide;

means for generating a region of focusing propagation constant in the

waveguide that substantially corresponds in shape to a shape of the planar electrode, by applying a voltage to the planar electrode; and

means for controlling a propagation constant level of the region of focusing propagation constant and a focal length by varying the voltage to control the focusing of light flowing through the waveguide.

35. A method for generating a focused output optical signal by passing an input optical signal through a waveguide, comprising:

providing a gate electrode proximate the waveguide;

providing a body contact electrode proximate the waveguide;

applying the input optical signal to the waveguide;

applying a voltage to the gate electrode that generates a region of focusing propagation constant in the waveguide; and

generating the focused output optical signal at a focal point that varies in response to variations of the voltage.